Demand Response and Advanced Metering Infrastructure

- Lee Hall, Smart Grid and Demand Response Program Manager, BPA Energy Efficiency
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- Melissa Newcomer, Business Development Representative, Kootenai Electric Cooperative
Targeting Success

Demand Response and Advanced Metering Infrastructure

Presented by:
Lee Hall, Smart Grid and Demand Response Manager
BPA Energy Efficiency
Background – What is Driving Activity?

- Peak demand is expected to continue to grow at an average rate of 1.7% annually.
- Load growth, wind integration and fish operations are testing the capacity of the Federal Columbia River Power System.
- The costs of building and permitting new resources is increasing.
- Legislation, including I-937, renewable portfolio standards, and cap-and-trade are limiting the types of new resources that utilities can acquire.
- The Northwest Power and Conservation Council’s Sixth Power Plan calls for research of Demand Response (DR) through pilot projects and technology demonstrations.

“And achievable technical potential for demand response in the region is around 5% of peak load over the 20-year plan horizon. The plan assumes 1,500 to 1,700 megawatts of load reductions in the winter and summer, respectively.... “

Sixth Northwest Power Plan, Chapter 5
Smart Grid and Demand Response

- Pacific Northwest Smart Grid Demonstration Project
  - $178 million five-year project led by Battelle Memorial Institute
  - Largest DOE demonstration award in nation
  - Project participants includes:
    - BPA
    - 12 utilities
    - 5 project-level vendors
  - 60,000 metered customers
  - 10 utility Demand Response tests

- Widespread AMI and DR Efforts in the PNW
  - E.g. Idaho Power, Pacificorp, Portland General Electric, Snohomish PUD, Central Lincoln...

- BPA Demand Response Program
BPA Demand Response Goals

The theme of BPA’s Demand Response program in 2010 and 2011 is to encourage Demand Response learning in the Pacific Northwest, with a view to support the creation of a longer term resource.

Goal 1 – Conduct Pilots. Be a catalyst for innovation by developing a broader base of NW learning and utility familiarity with Demand Response by running pilots.
- Advance testing and adoption of DR technologies
- Support market penetration in the Pacific Northwest
- Learn from end-customer engagement: customer recruitment strategies, education and program participation persistence


Goal 3 – Outreach and Awareness. Execute communication plan that furthers internal and external awareness of the value and learnings around Demand Response.

Goal 4 – Develop Long Term Strategy and Help Coordinate Policy in the Region. Support the creation of a long-term roadmap to build this resource within the region, develop BPA’s role as a hub of expertise, and collaborate with region on policy.
BPA Demand Response Program 2010 -2011

- **Residential Pilots**
  - In Progress: Kootenai Electric
  - Central Electric
  - Funding Opportunity Announcement released for additional pilots ($1,500,000)
    - Released: 2/18/2010
    - Letter of intent to respond: 3/19/2010
    - Responses due: 4/19/2010

- **Commercial & Industrial Pilots**
  - Initiating additional open ADR pilot(s) in Mid-2010
  - Selecting vendor partner to support program
  - Results available from SCL building pilot (Case studies to be released by early April)

- **Demand Response Knowledge Sharing**
  - Kicking off program to share advance DR learning in PNW. Mid-2010
  - Collaboration with Pacific Northwest Demand Response Project

- **Evaluating programs for long-term implementation**
Contact

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Additional resources:

- Northwest Power and Conservation Council’s Sixth Power Plan (Demand Response – Chapter 5)  http://www.nwcouncil.org/energy/powerplan/6/default.htm

- BPA Residential Pilot Funding Opportunity Announcement http://www.bpa.gov/Energy/N/demand_ann.cfm

- Smart Grid - PNW Smart Grid Demonstration Project http://www.bpa.gov/Energy/N/smart_grid/index.cfm

- Case Study for the Open ADR pilot with Seattle City Light  <will be posted by early April> http://www.bpa.gov/Energy/N/demand.cfm
Targeting Success

Load Management & Beyond

Presented by:
Beth Anderson ~ Manager, Island Network/Tech Services
Orcas Power & Light Cooperative
Introducing ~ OPALCO
Overview

- Load Management History
- TWACS Automatic Meter Reading (AMR)
- TWACS Demand Response (DR)
- Home Area Network (HAN) Pilot Project
- Future Plans
History - Load Management

- 1996 OPALCO/BPA Partnership – *Energy Partners*
- Reason ~ Peak Demand Control
- Targets:
  - Load Control Devices (LMR)
  - Conservation Reduction Measures
Cannon LMR
Load Management - Lessons Learned

- Target Specific Areas
- Know your State Electrical Rules for Inspections
- Select a Power Line Carrier Vendor with proven track record for Signal Propagation
- Prepare for program administration
- **Important** – Document all devices & locations
- Perform biennial inspections of devices
- Acknowledge that utility takes ownership of water heater circuit once installed
Fast Forward

- 2005 - Staff began a Comparative Analysis on AMR PLC Technologies; Selected ACLARA - TWACS
- 2007 – Installation of Aclara Power Line Carrier
- Features of TWACS
  - Two-way communication to all devices
  - No signal propagation problems
  - Meters read within seconds
  - Voltages can be checked at end of feeder
  - Solid platform for future applications
  - Demand Response solution
ACLARA Demand Response

- When energy demand is high, the Aclara DRU reduces peak-power costs without impacting customer service.
Aclara Demand Response Unit (DRU)

- Supports Direct Load Control Programs
- Can Protect end devices
- Improves Grid Reliability (Smart Grid)
- Minimizes end customer impact
- Controls Two Devices
- Provides Two-Way Communication and feedback
OPALCO/ACLARA HAN Pilot

- April 2010 – OPALCO & Aclara will deploy a Home Area Network (HAN) pilot project
ZigBee In-Home Displays (IHD)

- Provide Consumers with information to make more informed decisions
- Tracks real-time energy usage
  - Demand (kW and $/hr)
  - Current meter reading (kWh)
- Displays pricing information
  - Supports flat rates, TOU
  - Tracks kWh and $ by TOU tier
- Provide a mechanism for general broadcast text messaging
ZigBee Smart Thermostats – Key Features

- Programmable Thermostat
  - Benefits customer independent of DR events by providing a tool for cutting energy costs
- Allows remote temperature setbacks
- Provides event status display
- Supports basic text messaging
- Allows both mandatory and voluntary events to allow customer overrides
- Can react to Pricing Alerts (TOU)
Pilot Deployments started in January 2010 for Smart Thermostats

Will start deploying In-Home Displays in Mid-March

Pilot solution is meter-based -> Utilizing L+G Focus AX Meter
Future Plans

- Data mining of AMI readings
- Web interface for members to:
  - Check Usage
  - Turn on/off appliances
  - Manage their own loads
- Water meter reading – paid service to other utilities
- Pre-pay Metering/Billing
- HAN Project Full Deployment
Questions?

Thank You!
Contact

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Targeting Success

Demand Response Load Control

Presented by:
Melissa Newcomer, Business Development Representative
Kootenai Electric Cooperative, Inc.
The KEC Aclara® TWACS®® AMI System.

- Began installing the system in 2001
- System installation complete in 2003
- Reduced the response time to a power outage
- Bills more accurate
  - Old system: usage billed 30 to 60 days later
  - New system: current usage billed
  - Caused a high bill the first month implemented
The BPA/KEC Load Control Pilot

- Developing the pilot began in early 2009
  - Approval from Board of Directors
  - Defining scope of work
  - Contracting electricians
  - Designing the program to work with current staff
  - Delivery of products
- Installations began in January 2010
- The objective is to control residential water heaters and thermostats via our AMI system
Pilot Description

- The goal is to install load control equipment in 400 to 500 residential homes by October 2011.
- Water heaters and thermostats will be controlled.
- The pilot will cover two years and involves 8 load control “events”.
- Data loggers will be installed in 60 homes.
  - None currently installed.
How it Works

Kootenai Electric issues a demand response event

Event is transmitted via TWACS communications to meter and water heater
Home Area Network

TWACS ZigBee®
Demand Response Strategy

Remote Outlet Control
Programmable Controlling Thermostat
AMI Smart Meter
In-Home Display
Demand Response Unit
TWACS Net Server
Substation Communications Equipment
Aclara® Demand Response Unit (DRU)

- Provides direct load control
  - From KEC to DRU
- Two-way communication
- Provides a simple approach to control water heaters
  - Simply interrupting the power
How the DRU Works

- Power runs:
  - To the DRU
  - From DRU to water heater

- Three indicator lights
  - Power to water heater
  - Faulty DRU
  - Load control event
Energate Smart Thermostat

- Programmable Thermostat
  - A benefit to the member
- Setback temperature remotely
- Allows basic text messaging
- Both mandatory and voluntary events
- Can display time of use rates
  - Not currently used at KEC
How the Thermostat Works

- Utility Message allows for 50 characters in text message
- Home screen reads “load control” during event
- Blue LED light appears on thermostat during event
The Installation Process

- Change out meter
- Replace Thermostat
  - Program to equipment type and user preferences
- Install DRU(s)
- Check connection
  - Call KEC to search in the meter
  - Send text message “Welcome to the Peak Project”
Installation Pictures
Scheduling an Event

- KEC is notified the day before the event
- Communication to participants – 12hrs advance
  - Text message via thermostat
  - Automated phone message
  - E-mail notification
- KEC programs the event to occur
  - Send thermostat command in advance
  - Send DRU command in real time
- Download data and send to BPA
Be Ready for Anything

- **Meter**
  - Locking ring

- **Thermostat**
  - Wiring issues (auxiliary switch)
  - Is it compatible?

- **DRU**
  - Only one hot water heater?
Program Challenges

- Getting 400 homes to participate
- Explaining benefits to member
  - They want immediate savings on their bill
  - Do not want to sign participation agreement
  - Worried we can control too much
- Variety of HVAC systems
  - Multiple heat pumps, zonal systems
- Variety of thermostats, no wiring standard
- Thermostat preferences of member
  - They like the touch screen thermostats
Tracking Information

- Program created by our IT department to track member information

- Map was created by our GIS department to show locations of current participants and those interested
Current participant locations
Marketing the Program

- Marketing content written by ID Branding; approved by BPA and KEC
  - Direct mailing to targeted members
    • Post card and letter
  - Website articles and sign up information
  - Multiple articles in monthly newsletter
  - Bill inserts
  - Promotion at KEC events
Direct Mailing Post Card

Doing better by degrees°

Just a few of them°

The Peak Project

It's this simple. We'd like you to sign up.

The Peak Project is a program that reduces energy consumption for times of peak demand. By participating, you have slowed the demand for power on our system, saved some money on your energy bill, and a small sacrifice in your daily life. But it's a good thing!

Here's how if works:

1. On some days of peak energy usage, a KCEC member may receive a text message to lower their thermostat by a few degrees.
2. We'll turn off your water heater for a few hours, and adjust your thermostat for a few degrees. You probably won't even notice.

Sign up

Call 208.765.1100 or visit www.kec.com/peakproject.php
Website

Peak Project Form

Interested in learning more about participating in the Peak Project?
You may be eligible to participate if:

- You are a Kootenai Electric Cooperative member.
- You have a centrally controlled all-electric heating system.
- You live in the area shown in the map. If you don’t live in this area but are interested in participating we would like to put your name on a list for the future - please fill out the form below.

If you pre-qualify for the program, you will be asked to provide additional information. If you are selected to participate, a KEC representative will schedule a time to come to your home to install a programmable thermostat and a water heater monitor. You’ll also receive a free home energy audit during that initial visit to learn more about how you can save money on your electric bills. We’ll explain what will happen in your home at times of peak electricity demand (only a few times each year), and how you are helping your cooperative to assure there’s enough affordable electricity for all of us in the future. Please fill out the form below and click submit when complete.

Name: ____________________________

Address: __________________________

Account Number: __________________

Email Address: ____________________

Telephone Number: ________________

How did you hear about the Peak Project? Postcard

Comments:

Submit
Bill Insert

Doing better by degrees°

Just a few of them°

Here’s how it works:

1. On some days of peak power usage by Kootenai Electric members...
2. We turn off your water heater for just a few hours, and adjust your thermostat by a few degrees. You probably won’t even notice.
3. Multiplied across hundreds of homes, this reduces stress on the electrical system and helps ensure a reliable power grid.

It’s this simple. We’d like you to sign up.

The Peak Project is a program that reduces energy consumption at times of peak demand. By participating, you help slow the demand for power on our system, and could save money on your energy bill. It’s a small sacrifice in each home, but if enough members sign up for Kootenai Electric Cooperatives Peak Project, it will make a huge difference in our electrical demand. You may be eligible to participate if:

- You live south of the Spokane River in Coeur d’Alene and Post Falls, or north of the Spokane River and south of Ponderosa Ave. in Post Falls.
- You have a centrally controlled all-electric heating system.
- You have an electric hot water heater.

Sign up by calling 208.765.1200 or visit www.kec.com/peak_project.php
Welcome Kit

Welcome package
- Decked Kraft 6x6 in Conexed
- Oversized sticker with welcome letter

Liner poster
For window display

Degree sign static

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It’s a Company Effort

- Departments heavily involved
  - Marketing
  - Engineering
  - IT/GIS
  - Member Services
Contact

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